

What is Claimed:

1. A bonding tool for bonding a wire to a substrate, the bonding tool having a body and a working tip coupled to one end of the body, and comprising:
an orifice extending along a longitudinal axis of the body and the working tip; and

a coating disposed over at least a portion of a surface of the orifice.

2. A capillary bonding tool according to claim 1, wherein the coating extends along an entire length of the orifice.

3. A capillary bonding tool according to claim 2, wherein the coating is applied to at least a portion of an exterior surface of the working tip.

4. A capillary bonding tool according to claim 1, wherein the coating is disposed over at least a portion of an exterior surface of the working tip.

5. A capillary bonding tool according to claim 1, wherein the coating is disposed over an exterior surface of the working tip and the body.

6. A capillary bonding tool according to claim 1, wherein the coating is a polymer.

7. A capillary bonding tool according to claim 1, wherein the coating is at least one of i) a polymer, ii) an Alumina, iii) Si_3N_4 iv) silica v) a combination of 12% silica and 88% Alumina, and vi) Diamond like Silica (DLC).

8. A capillary bonding tool according to claim 1, wherein the coating is a polymer disposed along an interior surface of the orifice and one of i) an Alumina, ii) Si_3N_4 , iii) silica, iv) a combination of 12% silica and 88% Alumina, and v) Diamond like Silica (DLC) disposed along an exterior portion of the orifice.

9. A capillary bonding tool according to claim 1, wherein the coating has a substantially uniform thickness.

10. A capillary bonding tool according to claim 1, wherein the coating has a substantially uniform thickness of up to about 2.0 microns.

11. A capillary bonding tool according to claim 1, wherein the coating has a substantially uniform thickness of about 0.1 microns.

1 12. A capillary bonding tool according to claim 1, wherein the body
2 of the bonding tool has a substantially cylindrical shape.

1 13. A capillary bonding tool according to claim 1, wherein the
2 coating is one of polyolefine and parylene.) ?

1 14. A capillary bonding tool according to claim 1, wherein the
2 coating is formed by vapor phase deposition. Product by Process

1 15. A capillary bonding tool according to claim 1, wherein the
2 coating is formed by one of chemical vapor deposition and physical vapor deposition.

1 16. A capillary bonding tool according to claim 1, wherein the
2 coating is formed by immersing the bonding tool in a coating material.

1 17. A method of manufacturing a capillary bonding tool for bonding a
2 fine wire to a substrate, the method comprising the steps of:

3 forming a cylindrical body;

4 forming a taper at a first end of the body;

5 forming an orifice extending along a longitudinal axis of the body; and

6 coating at least a portion of the orifice with a polymer.

1 18. The method according to claim 17, wherein the coating step
2 forms a substantially uniform continuous coating having a thickness of up to about 2.0
3 microns.

1 19. The method according to claim 17, wherein the coating step
2 forms a substantially uniform continuous coating having a thickness of at least about
3 0.1 micron.

1 20. The method according to claim 17, wherein the coating step
2 comprises the steps of:

3 forming a precursor monomer at a first temperature and a first pressure;
4 and

5 forming the coating from the precursor monomer at a second
6 temperature and pressure.

1 21. The method according to claim 20, wherein

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2 the first temperature is about 690°C,
3 the first pressure is about 0.5 torr,
4 the second temperature is about 25°C, and
5 the second pressure is about 0.1 torr.

1 22. The method according to claim 20, wherein the precursor
2 monomer is formed from a di-Para-Xylyene dimer vaporized at about 150°C and
3 about 1.0 torr followed by a pyrolysis at about 690°C and about 0.5 torr.

1 23. The method according to claim 17, wherein the capillary is
2 formed by i) one of direct ceramic dye pressing and ii) injection molding, and
3 machined to a final shape by one of i) grinding and ii) Electro discharge machining.

1 24. A bonding tool for bonding a wire to a substrate, comprising:
2 a body portion;
3 a working tip coupled to one end of the body;
4 an orifice extending along a longitudinal axis of the body and the
5 working tip;
6 a first coating disposed over at least a portion of a surface of the orifice;
7 and
8 a second coating disposed over at least a portion of an exterior surface
9 of the body.

1 25. A capillary bonding tool according to claim 24, wherein the first
2 coating is a polymer and the second coating is other than a polymer.

1 26. A capillary bonding tool according to claim 25, wherein the
2 second coating is one of an alumina and Si_3N_4 .

1 27. A method of manufacturing a capillary bonding tool for bonding a
2 fine wire to a substrate, the method comprising the steps of:

3 forming an orifice extending along a longitudinal axis of the bonding
4 tool;

5 coating at least a portion of the orifice with a polymer; and

- 6 coating at least a portion of an exterior surface of the bonding tool with
7 a non-polymer coating.